# Oil palm (Elaeis guineensis Jacq.) tissue culture ESTs: Identifying genes associated with callogenesis and embryogenesis

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## Summary

Abstract Background Oil palm (Elaeis guineensis Jacq.) is one of the most important oil bearing crops in the world. However, genetic improvement of oil palm through conventional breeding is extremely slow and costly, as the breeding cycle can take up to 10 years. This has brought about interest in vegetative propagation of oil palm. Since the introduction of oil palm tissue culture in the 1970s, clonal propagation has proven to be useful, not only in producing uniform planting materials, but also in the development of the genetic engineering programme. Despite considerable progress in improving the tissue culture techniques, the callusing and embryogenesis rates from proliferating callus cultures remain very low. Thus, understanding the gene diversity and expression profiles in oil palm tissue culture is critical in increasing the efficiency of these processes. Results A total of 12 standard cDNA libraries, representing three main developmental stages in oil palm tissue culture, were generated in this study. Random sequencing of clones from these cDNA libraries generated 17,599 expressed sequence tags (ESTs). The ESTs were analysed, annotated and assembled to generate 9,584 putative unigenes distributed in 3,268 consensi and 6,316 singletons. These unigenes were assigned putative functions based on similarity and gene ontology annotations. Cluster analysis, which surveyed the relatedness of each library based on the abundance of ESTs in each consensus, revealed that lipid transfer proteins were highly expressed in embryogenic tissues. A glutathione S-transferase was found to be highly expressed in non-embryogenic callus. Further analysis of the unigenes identified 648 non-redundant simple sequence repeats and 211 putative full-length open reading frames. Conclusion This study has provided an overview of genes expressed during oil palm tissue culture. Candidate genes with expression that are modulated during tissue culture were identified. However, in order to confirm whether these genes are suitable as early markers for embryogenesis, the genes need to be tested on earlier stages of tissue culture and a wider range of genotypes. This collection of ESTs is an important resource for genetic and genome analyses of the oil palm, particularly during tissue culture development.